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Assessing Performance Outcomes of New Graduates Utilizing Simulation in a Military Transition Program

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This multi-site, quasi-experimental study examined the performance outcomes of nurses ($n = 152$) in a military nurse transition program. A modified-performance instrument was used to assess participants in two high-fidelity simulation scenarios. Although results indicated a significant increase in scores posttraining, only moderate interrater reliability results were found for the new instrument. These findings have implications for nurse educators assessing performance-based outcomes of new nurses completing transition programs.

Since 1977, the Air Force has offered a nurse transition program (NTP) for newly commissioned nurses with less than 1 year of experience as a registered nurse. The purpose of the NTP program is to prepare newly commissioned registered nurses to practice safe and effective nursing care in the military environment that includes practice at both military treatment facilities as well as deployed locations. The program has evolved over time to an approximately 3-month program offering supervised clinical practice with a trained preceptor, didactic content, and laboratory experiences that include task training as well as high-fidelity simulation scenarios. Yet, little is known about the outcomes of graduates of the current program. Increasing emphasis has been placed on developing evidence-based practice approaches for preparing new graduates for

transition to practice. Therefore, it is important for Air Force leaders to understand if the NTP is preparing nurses who are ready to meet the unique challenges of military nursing practice after completion of the program, especially in light of the addition of new nonmilitary sites providing this training. Because of these uncertainties, the aim of this study was to examine performance outcomes of graduates completing the military NTP program using high-fidelity simulation technology.

LITERATURE REVIEW

The gap between education and practice for nurse graduates is not new but appears to be widening because of the higher acuity level of patients with more complex nursing needs (Beyea, Slattery, & von Reyn, 2010; Olejniczak, Schmidt, & Brown, 2010). Recent studies have reported that nearly 90% of academic leaders believe nursing students graduate fully prepared to provide safe and effective care, yet only 10% of nurse executives believe these new graduates are prepared for practice (Berkow, Virkstis, Stewart, & Conway, 2008). The consequences of this gap include stress and dissatisfaction, which have been attributed to costly decreased retention rates of new nurses. Reports estimate that between 30% and 50% of new nurses voluntarily leave positions in the first year of employment (Hillman & Foster, 2011).

Although orientation and transition programs have been in place to assist new nurses with the transition to practice, the widening gap between practice and education has resulted in expanded efforts to identify best practice approaches for easing this transition. The literature now indicates evidence to support a nurse orientation and residency training platform that includes components such as didactic instruction, peer support, and clinical supervision by a trained mentor (Anderson & Linden, 2009; Bullock, Paris, & Terhaar, 2011; Hillman & Foster, 2011; Institute of Medicine, 2011) as well as scenario-based high-fidelity simulation experiences (Beyea et al., 2010). Evidence emerging from these nurse residency programs is limited to outcomes such as nurse and preceptor satisfaction, retention rates, cost savings, or self-reports of confidence and

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competence. Evidence related to the evaluation of performance outcomes and competency of participants in these training programs is lacking (Olejniczak et al., 2010). One of the five key suggestions for providing an effective NTP is to include competency-based assessments that identify if the transition program provides not only for individual nurse needs but also the unique competency requirements for the area of practice of the new nurse (Pattillo, 2012).

One available method for the evaluation of performance of new graduates of transition programs is the use of high-fidelity simulation (Boulet et al., 2011). The use of simulation is now increasing exponentially in academic institutions as well as practice arenas for orientation and continuing education purposes (Leigh, 2011), including orientation and transition of new graduates (Olejniczak et al., 2010). These highly sophisticated mannequins can now realistically mimic patient care situations for the purposes of training, evaluation, and research (Jeffries, 2007). However, use of these high-fidelity simulation scenarios for evaluation purposes has been limited, with most research focusing on self-reports of student satisfaction and self-confidence. There is minimal research available to support documentation of clinical performance using simulation (Norman, 2012). The dearth of performance-based simulation education has been attributed to a lack of valid and reliable instruments to assess outcomes (Boulet et al., 2011; Kardong-Edgren, Adamson, & Fitzgerald, 2010). Reliable and valid instruments are needed to assess outcomes of participants using simulation, including performance outcomes of new nurse graduates of transition programs (Aronson, Glynn, & Squires, 2012). Therefore, the purpose of this study was to examine the performance outcomes of graduates of a military-specific NTP using high-fidelity simulation. A secondary purpose of the study was to evaluate the reliability and validity of a modified instrument used to measure these outcomes.

THEORETICAL FRAMEWORK

Benner's (1984) novice-to-expert nursing framework was used to guide this research study. Benner's model provides a description of the process of a new nurse's development through clinical practice and exposure to positive role models (Larew, Lessans, Spunt, Foster, & Covington, 2006; Waldner & Olson, 2007). Benner discussed the five stages of competence as novice, advanced beginner, competent, proficient, and expert. Benner's theory predicts that nurses with higher competency will identify problems more quickly based on subtle cues. Using the performance outcome instrument developed for the study, the hypothesis was that the nurse transition training program would lead to a change in performance from the novice with no experience at the beginning of training to the advanced beginner able to practice with minimal cues after the training.

RESEARCH QUESTIONS

The following research questions guided the evaluation of the NTP program in this study:

1. What are the performance outcomes of graduates of an NTP?
2. Is there a difference in post-NTP program performance scores between participants who complete the program at a military facility compared with those who complete the program at a civilian treatment facility?
3. Is there a relationship between demographic characteristics of NTP participants and performance outcome scores?
4. What is the reliability and validity of the modified simulation evaluation instrument for measuring performance outcomes of new nurse graduates of the Air Force NTP?

METHODS

Setting

At the time of the study, the NTP was offered to new military nurses at one of eight military treatment facilities (seven stateside military treatment facilities and one facility in Germany) and two civilian facilities. All sites provide new military nurses an opportunity to develop nursing skills, including basic nursing skills, emergency management skills, and team-leadership skills over a 3-month period. A military nurse educator provides oversight to the program at both military and civilian sites. All facilities providing the NTP program at the time of the study participated. All facilities used simulation centers to incorporate high-fidelity simulation experiences for training and evaluation purposes during the NTP program. Although the type of simulators varied at each site, mannequins at all sites were high-fidelity simulation mannequins capable of exhibiting the physiological parameters required for the scenarios of the study. All sites also had access to similar patient care resources (e.g., intravenous pumps, foley catheters) required for each scenario. Institutional review board approval was obtained through the Air Force for all sites.

Sample

To be eligible to participate in the NTP program, newly commissioned Air Force officers must have completed a 30-day commissioned officer training course, have a registered nurse license in any state, and have less than 1 year of experience. Participants at each of the 10 NTP training program sites who met these inclusion criteria were solicited to participate in the study. Although 165 nurses were eligible to participate, results from 152 participants were included in the final analysis because of errors in reporting for one of

the sites, leading to a 92% participation rate. Informed consent was obtained from each of the subjects used in this research as required by 32 CFR 219 and Air Force Instruction 40–402.

Instruments

The simulation evaluation instrument was used to evaluate the performance of NTP participants before and after participation in the program. This instrument was based on a research instrument developed to assess performance outcomes using simulation in a previously funded military study and modified with permission to fit the simulation scenarios used for the current study (Bridges, 2008). The instrument evaluated whether a participant completed the objectives of the two scenarios (anaphylaxis and trauma) used in the study and was scored with 0 for any objective that was considered “not done,” 1 if “partially done,” and 2 if the objective was “done.” Although the original instrument used similar scoring guidelines, this instrument’s objectives were modified by intensive care and emergency room clinical nurse specialists to reflect current practice guidelines as well as content provided in the NTP training program. The instrument consists of a checklist of 28 objectives/steps for the trauma simulation scenario and 26 objectives/steps for the anaphylaxis scenario. Face validity of the instrument was established by an expert panel of four nurses who had served as instructors or directors of the NTP program. Raters at all program sites were trained on the use of the instrument before initiation of the study. During the study, participants were evaluated by two observers for both pretraining and posttraining simulation experiences.

A demographic survey was also used to describe the sample. The demographic survey solicited information including age, prior military service, and nursing school attended for undergraduate work.

Design

A multi-site, pretest/posttest quasi-experimental design was used for this study. NTP program participants at all training sites were evaluated individually by two observers on their performance using two simulation scenarios before and at the completion of the NTP training program using the modified simulation evaluation instrument.

Procedure

All new nurse graduates participating in the NTP program at the 10 training sites were invited to take part in the study during the first week of training. All those who met inclusion criteria and agreed to provide consent were invited to participate. Study participants individually completed the two simulation scenarios during the first week of training

and again at the conclusion of training. All sites used the same standardized scenarios using similarly featured high-fidelity simulation mannequins. Two experienced nurses evaluated each subject as he or she participated in the scenarios and rated performance using the modified simulation evaluation instrument. NTP course directors at each location collected information from the demographic survey at the beginning of the course. At the end of each course, scores from the pretest and posttest simulation evaluation and demographic surveys were collected for analysis.

RESULTS

Although a total of 165 NTP students volunteered for the study, 13 were excluded because of incomplete data leading to a final sample of $n = 152$. The average age of participants was 26.99 years, with 62% having some prior military experience. There were no general trends in nursing school background with participants reporting completion of 126 different baccalaureate nursing programs.

Performance outcomes were measured using scores from the simulation evaluation instrument from both scenarios, with each scenario analyzed individually (see Figures 1 and 2). These figures show, that for both training scenarios, all objectives showed improvement in performance from pretest to posttest with a larger increase in scores from pretest to posttest with the trauma scenario.

A paired samples *t* test was run to determine differences between pre- and post-NTP program performance scores from both scenarios. All 28 objectives were significantly different between pretesting and posttesting for the trauma scenario ($p < .05$). For the anaphylaxis scenario, 21 of 26 objectives showed a statistically significant difference between pretest and posttests ($p < .05$).

An additional analysis was conducted to determine if there were differences in outcomes based on whether participants completed the training at a military or civilian treatment facility using a general linear model for multiple comparisons across all objectives. Scores from the anaphylaxis scenario showed that 13 of 26 objectives were significantly different between pretest and posttest in terms of military versus civilian training sites ($p < .05$). Overall, participants at military training sites averaged higher scores than those at civilian training sites for the anaphylaxis scenario. Several anaphylaxis objectives scores were significantly higher for military training sites compared with civilian training sites. Two anaphylaxis objectives (22 and 23; see Figure 1) were higher for civilian training sites versus military training sites. The content of these two objectives focused on environmental exposure. The trauma scenario showed that 14 of 28 objectives were significantly different between pretest and posttest when comparing military versus civilian training sites ($p < .05$). Overall,

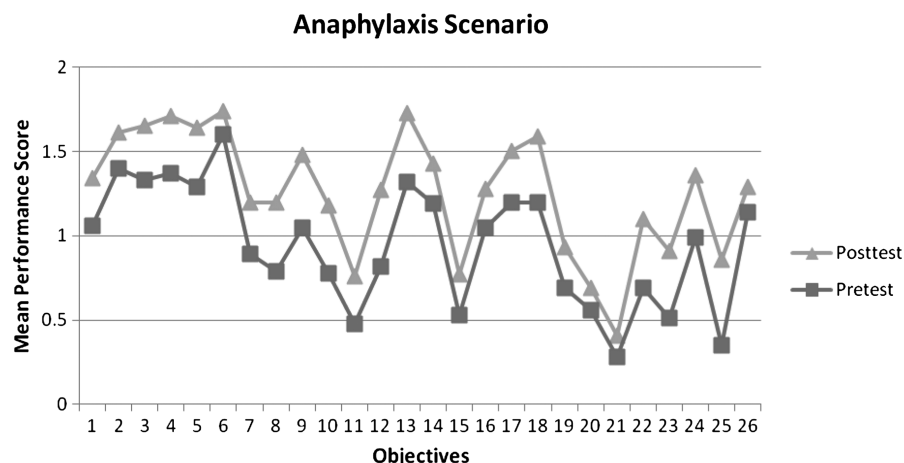


FIGURE 1 Pretest and posttest mean performance scores for all 26 objectives of the anaphylaxis scenario.

nurses at military training sites averaged higher scores than the civilian training sites for the trauma scenario, although several items were higher for the civilian versus military training sites (see Figure 2). A multivariate analysis of variance comparing military to civilian training sites performance scores indicated a significant difference between military and civilian training site scores overall ($F = 13.418, p < .05$), with participants at military training sites scoring higher.

The relationship between the demographic variables and performance scores was also analyzed. The demographic characteristic of “prior military service” and NTP performance scores was tested using Bonferroni’s multiple comparisons. Only one objective had a significant difference for the anaphylaxis scenario ($p < .05$). The same statistical test only found four objectives to have a significant difference for the trauma scenario ($p < .05$). No other characteristics were found to be significant.

An additional analysis was done to determine internal reliability of the simulation evaluation instrument. The

Cohen’s kappa score for the anaphylaxis scenario objectives on the instrument was 0.561, and for the trauma scenario score, it was 0.560. This analysis indicates a moderate reliability in internal consistency of this newly developed instrument (Houser & Bokovoy, 2006).

DISCUSSION AND IMPLICATIONS

Competency-based assessment and evaluation specific to the unique practice area of new nurse graduates has been recommended as one method to provide a successful transition to practice for new graduate nurses (Pattillo, 2012). This study provides information regarding the use of high-fidelity simulation to measure performance outcomes of graduate nurses in their transition to military nursing. Results indicate that participants were able to show significant differences for most of the objectives evaluated using the simulation evaluation instrument, demonstrating the positive outcomes of the training program. The results also support a change in knowledge and skills as would be predicted based on

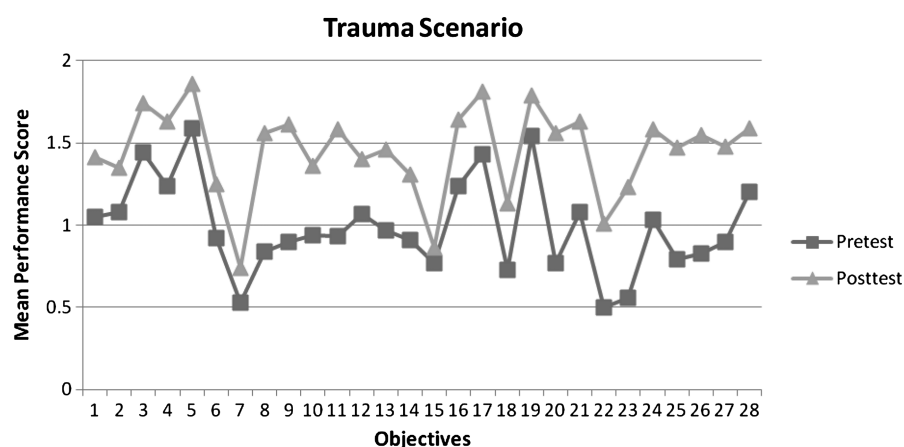


FIGURE 2 Pretest and posttest mean performance scores for all 28 objectives of the trauma scenario.

Benner's (1984) model of enhanced level of practice with training and role modeling provided in an NTP. On the basis of performance in the high-fidelity simulation experiences, participants were able to show movement from novice to the advanced beginner.

Demographic characteristics did not seem to correlate with outcomes, indicating that the program provides valuable opportunities whether participants had prior military experience as well as those of varying ages and prior undergraduate nursing program preparation. Although Pattillo (2012) suggested the importance of competency assessment based on individual needs, it appears that these unique demographic characteristics did not make a difference in competency in this study.

Also of significance was the evaluation of the psychometric properties of the new simulation evaluation instrument based on the interrater reliability scores (0.561 for anaphylaxis, 0.560 for trauma) of the 30 observers using the instrument. Kardong-Edgren et al. (2010) identified the paucity of reliable and valid instruments for evaluation of participant performance using simulation. It has been recommended that simulation research must extend to better understand how new simulation technologies can be used for assessment of outcomes through studies providing documentation of valid and reliable scoring instruments as well as an understanding of how these instruments vary with the competencies being measured (Boulet et al., 2011). In this study, the interrater reliability scores of this newly developed instrument show only moderate agreement between raters. Further testing of this instrument with additional participants and revisions appropriate to civilian NTPs would provide additional information needed to determine the appropriateness of this instrument for measuring performance outcomes of nurse transition graduates and provide additional outcome measures for these programs that adequately capture the development of knowledge and skills as predicted by Benner's (1984) model.

LIMITATIONS

Limitations of this study include use of a military-specific sample for evaluating performance using simulation. Use of this population may limit generalization of findings as these participants may not represent the general population of new nurse graduates. In addition, this study was limited to the evaluation of performance as an outcome of the Air Force NTP program. The study did not address other outcomes of significance including nurse and preceptor satisfaction, financial considerations, or transfer of performance to actual clinical practice. Another limitation of the study is the use of a pretest/posttest design without a control group for comparison of results. Finally, the results may be a result of maturation over new nurses over time and not related to influence of the training course itself.

CONCLUSION

Nurses in professional development must use evidence-based approaches to ease the transition of nurse graduates from the academic environment to the practice arena. This is even more critical now with the recommendations of the Institute of Medicine (2011) regarding the need for nurse residency programs to promote a safe transition to practice. Although evidence is emerging to support the use of transition training models, most available research supports the satisfaction and retention rates of new graduates, not the actual competency levels of these graduates after participation in a transition program. This study provides new evidence to support the performance outcomes of a transition program designed to meet the unique competencies of new graduates entering a military-specific healthcare setting.

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